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THE MEZQUIT.[1]

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Name.—This tree, the most notable feature of our Southwestern sylva, belongs to the large order of Leguminosæ, suborder Mimoseæ. It was first described by De Candolle under the name of *Prosopis juliflora*, which, therefore, has precedence. Prosopis, as applied by Linnæus, is meaningless; the specific name (julus, a catkin) refers to the catkin-like spikes of the inflorescence. It is the *Algarobia glandulosa* of Torrey and Gray's Flora (from Algaroba, Mexican synonym of mezquit, the specific name referring to the stalked glands borne on the anthers), later changed into *Prosopis glandulosa* by Dr. Torrey, in the Flora of the Mexican Boundary Survey.

Habitat.—The mezquit finds a congenial home through Mexico, and extends to Chili and Brazil in South America. It flourishes on the southwestern territory of the United States, specially in Texas, New Mexico, and Arizona, being by far the most common tree or shrub of the immense desert tracts drained by the Rio Grande, Gila, and Lower Colorado. It does not grow near the seashore, except at the mouth of the Rio Grande. If, from this point, we proceed northward, we find that the mezquit disappears from the coast and recedes inland twenty or thirty miles, remaining at about that distance from the sea up to Victoria and Columbus; thence the line of its eastern limit runs directly north, passing a few miles out of Dallas; bending slightly westward, it then crosses the Red river, and, entering the Indian Territory, passes north of Fort Sill, crosses the Canadian, and strikes the 37th parallel where the 100th meridian intersects it. Near this point, Mezquit creek, from Kansas, empties into Cimarron river. The northern limit may be said, practically, to be the 37th parallel; that is, the southern boundary of Colorado and Utah. It takes in the southern point of Nevada, the large desert tracks of South-eastern California, and, at its extremity, bends down towards Fort Tejon. The western limit is the rather uncertain line made by the western margin of the Mojave and Colorado deserts, nowhere, as far as I know, coming close to the shore of the Pacific.

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[1] This name, often misspelt and mispronounced, is, in its Mexican form, mezquite, with the accent on the penult, and the last syllable obscurely sounded. North of the Rio Grande, in its Americanized form, it drops the final e, but otherwise retains the Mexican accent and pronunciation, thus, mezkeet′.

Description.—Shrub, or tree, with thorny branches and deciduous foliage.

Bipinnate leaves, single or in clusters, mostly armed with a pair of stout, straight, whitish thorns. One, seldom two, pairs of pinnæ; these 3–6 inches long, bearing 8–15 pairs of leaflets, which are linear-oblong, rigid, 1–2 inches long, and 1½–3 lines wide, varying much in size according to soil and stage of growth. Petiole 2–4 inches long, minutely stipulate, bearing at its apex a cup-shaped gland and filiform appendage.

Flowers 5-parted, a line or more long, on short but distinct pedicels; in axillary, short-peduncled, cylindrical spikes, 1½–4 inches long; greenish-white at first, later more conspicuously yellow from the exserted stamens; very frequent. Calyx smooth, short, hardly half as long as the corolla, with short, acute teeth. Petals valvate, narrowly long, free, greenish or yellowish-white, smooth outside, woolly within and at the apex. Stamens 10, free, exsert, straight and diverging, at least twice as long as the corolla, with versatile anthers; the large, blackish connective mostly bearing at its apex a stalked gland. Ovary shortly stipitate, woolly; style with small terminal stigma as long as the stamens.

Ripe pods white yellowish, mottled with red; 4–8 inches long, 10-20 seeded; from 2 to 12, seldom more than 5 or 6 on the same peduncle; linear, compressed, falcate, constricted between the seeds, indehiscent. Exocarp ligneous and tough; mesocarp thickish and spongy; endocarp papyraceous, inclosing the seeds in separate, flat casings, quadrate from natural pressure, and placed obliquely in the pod of which they occupy nearly the whole breadth.

Seed oval, smooth, suspended from the apex of the apparent cell by a long, coiled funiculus, with ascending radicle and plane, foliaceous cotyledons.

Size and Shape.—In size the mezquit ranges from an inconspicuous bush to a middle-sized tree. On high plains, alkali flats, or stony bluffs, it is a gnarled, stunted shrub, while on rich bottom-land it becomes a tree forty feet high, with an undivided trunk 2 feet in diameter, and from 7 to 10 feet long. Most of the arborescent mezquit, however, is only 6–12 inches thick; and shrubby mezquit, of all proportions, preponderates over the arboreal. The largest trees I have seen are in Southeastern California and Southeastern Texas.

The trunk usually divides a short distance above ground, and gives off crooked branches at various angles and heights, so that most trees have a loose, straggling, unsymmetrical shape. Under very favorable circumstances the mezquit becomes even-spreading and round-headed, bearing at a distance some resemblance to the apple-tree.

Foliage.—The mezquit, naked and repulsive in winter, begins, early in March, to clothe itself with verdure, giving life and freshness to the dreary slopes and bottom-lands. Its early foliage is of the most delicate emerald-green, which gradually deepens without ever reaching a somber hue. The scattered leaflets, thin and rigid, sift the sunlight, and only throw on the ground a speckled and illusory shadow, in which one vainly seeks protection from the heat. This thinness of foliage, apparently intended to prevent excessive loss of moisture, would prepare one to expect comparatively few stomata on the surface of the leaves, they being the open mouths through which aqueous exhalation takes place; but the fact is, that they are numerous, indeed far exceeding in number those found on plants growing in more favored climes. Thus the mean of several observations was, for the upper surface, 63,660, and for the under surface 143,235 on the square inch. It may be noted that the leaflets stand in all positions, oftener in a vertical or oblique plane than horizontally, and therefore that the difference between the two sides, almost equally exposed to light, is also remarkable.

Flower and Fruit.—The mezquit begins to blossom about the middle of May, and crops of flowers succeed one another until the middle of July. The pods, or "beans," form early in June, and ripen throughout July and August. In dry places they are ripe before the end of June, while in other localities they are not yet mature on the first of September.

Roots.—The roots of the mezquit seem, in a great measure, to exist independently of the stems, and may attain large proportions when hardly any foliage is visible above ground. It is probable that when the branches have been destroyed by fire, or stunted by hot, desiccating winds, the sap brought up by the deep rootlets is mostly assimilated by the upper superficial roots, which grow thick and tortuous. Sometimes, in the Southwest, camps are pitched on plains where no timber or fuel of any sort is visible. It is then that the frontiersman, armed with spade and axe, goes "digging for wood." He notices a low mound, on whose summit lie a few dead mezquit twigs; within it he finds large, creeping roots, which afford an ample supply of excellent fuel. These roots can be pulled out in pieces fifteen to twenty feet long, with a yoke of oxen, as practiced by the natives in the sandy deserts of New Mexico and Arizona, where no other fuel can be had.

Mezquit roots are of two kinds. Some dip vertically into the ground, solely in quest of food; others spread laterally, often many yards, before sinking inwards, their object apparently being to extend the area of supply and steady the plant. These horizontal roots, radiating in all directions, form a loose netting in the subsoil, helping to hold and compact it together. The heaping of the sandy soil around the base of the stems, by the wind, causes secondary roots and branches to start, which entrap and retain more of the light earth, so that presently each tree or shrub appears as if growing from a mound. Of the vertical roots, the taproot is often the only large and conspicuous one. It plunges down to a prodigious depth, varying with that at which moisture is obtainable. On the sides of gulches one can trace these roots down thirty or forty feet. They branch off and decrease in size if water is near by; otherwise they, even at that depth, retain about the same diameter, giving off but few unimportant filaments. How much farther they sink can only be conjectured. In the valley of the Rio Grande, big mezquit trees grow at an altitude of forty and fifty feet above the river level.

It would seem, then, that the mezquit, at least in the arborescent form, does not depend for the water it requires upon the moisture of the subsoil, but is enabled to extract it from the lower strata, and that its spongioles are bathed in permanent water. This is useful practical knowledge. Thus, wherever it reaches the proportions of a tree, we may be reasonably sure that water is within forty or fifty feet, and, wherever it grows as a thrifty shrub, within fifty or sixty, whatever may be the character of the surface stratum. The most desolate parts of the Staked plains are the Sand-hills—bare heaps of shifting sand. Between these are sometimes found large, vigorous mezquit shrubs, the only arborescent vegetation there. The inference would be that water, although too deep for the ordinary shrubs of the country, is accessible to the mezquit, and should be reached at a depth of about sixty feet, a conclusion practically verified by the digging of wells along the Texas-Pacific railroad.

When the roots have to dip down to a greater depth than sixty feet, the stems remain dwarf and scrubby.

Climate and Soil—The mezquit is not very sensitive to cold, and frosts, if not below zero, do it no apparent harm. It thrives best, however, in a hot and dry climate; one with mild winter and high summer temperature, small rainfall and clear atmosphere. Such climate is that of the Southwestern States and Territories. Within these there is hardly any soil, if not habitually damp, in which mezquit cannot grow; no hill is too rocky or broken, no flat too sandy or saline, no dune too shifting, no prairie too often burned, to entirely exclude it. It attains its full development on dry, loamy bottom-lands, where the soil is rich and porous, the water not too deep, and the prevalent winds shut off. On the contrary, it dwindles to its minimum size, a mere cluster of twigs, on high grassy slopes and rolling prairies, often visited by fires and always swept by winds.

When once in possession of the soil, it becomes a sort of arborescent weed, of wonderful vitality, and most difficult of eradication. Thus I know of a military post where the bushy growth of mezquit covering the parade was cut close to the ground twice a year; but these successive mutilations only rendered it more vigorous, so that the labor of cutting and pruning increased every year. Again, I remember a good-sized shrub which had tumbled down, with the overhanging edge to which it clung, to the bottom of a ravine; there it lay prostrate, mangled, head under, partly buried, and roots in the air. In its fall the main or top root had been broken; but two vine-like rootlets, ten feet long, issuing from the side of the ravine, still remained connected with it, and, judging from the unfaded foliage, furnished enough nutriment to sustain life.

Propagation and Growth.—One, viewing the extent and denseness of mezquit woods, and the intricacy of the many creeping, superficial roots, would be likely to suppose that this plant propagates itself by subterranean runners. Such is not the case. Often, indeed, the base of shrubs, or small trees, becoming buried in the loose soil, secondary branches growing off the spreading lower limbs now under ground, may seem to spring from runners, but it is merely so in appearance; mezquit is propagated by seed only.

It seldom happens that the pods, as they drop to the ground, are placed under favorable conditions for germination; they mostly decay on the soil, or are destroyed by insects; so that we may, in the spring, explore extended woods without finding a single yearling sprout. The spontaneous growth of seedlings occurs only in particularly propitious seasons, at irregular intervals of years.

We often see spring seedlings, growing unbidden, in cultivated beds or plots which have been watered and fertilized; likewise around the edges of manure heaps after rains; so that there should be no difficulty, with some care, to raise the plant from the seed at will. The indehiscent pod should be broken into its many one-seeded joints, and these planted at the beginning of the rainy season in well-prepared ground. Next year the young seedling may be a foot or more high, and can be transplanted, wherever wanted, during the summer rains. In four or five years it has become a goodly shrub.

Thereafter the growth of the mezquit is very slow. When about thirty years old, the stem is seven or eight inches in diameter; when about fifty, from eight to 10 inches; when about seventy-five, from ten to twelve inches; and when the diameter exceeds a foot, the tree is one hundred years or more old.

Generally sprouts grow in clusters, because of the germination of several seeds from the same pod. On rich bottom-land the strongest stem, in time, destroys the others, and alone survives into a tree; on higher and dryer land several of the stems develop simultaneously, forming clusters of thick shoots more or less coalescing at base, a mode of growth common on the hills about San Antonio.

The dissemination of the seed, shut up in the closed pod, is always difficult. There are agencies, however, which may transport pods or seeds at indefinite distances. One is water, rushing with great force through many arroyos towards rivers. To it is due, in part, the fact that most valleys and bottoms are timbered with a large proportion of mezquit. Another is the fæces of horses, mules, cows, and native mammals which feed on the pods; they always contain the undigested pips in good condition for germination.

Uses.—The foliage of the mezquit is practically useless. If at times goats or mules are seen to browse it, one may be sure there is no other food within reach. I have been told that, on the Lower Rio Grande, cows sometimes eat the young leaves in the early spring, and that their milk, in consequence, becomes bitter and unfit to use.

The trunk is ordinarily too short, and often too crooked and knotty, to make it serviceable as timber. Mezquit posts, much used in fencing, are said to be indestructible, whether under or above ground.

I believe this plant is capable of making excellent hedges. Seedlings, as mentioned before, are easily raised, and if transplanted in prepared ground during the rainy season, they should, in three or four years, develop into vigorous shoots, which, by proper pruning and trimming, will form impenetrable hedges.

The wood is very hard, heavy, fine-grained, and takes a beautiful polish. Longitudinal sections are prettily marked with wavy, sinuous veins; the very eccentric rings, although very close, are distinct; the serried medullary rays are hardly visible to the naked eye. The heart-wood is richly colored, its several zones varying from yellowish-red to purple, and contrasts sharply with the pale yellow of the superficial layers. These qualities render mezquit wood valuable for cabinet-work. Unfortunately it too often happens that the zones of the heart-wood are fissured, decayed, or detached from each other, so that it is difficult to get flawless boards.

In San Antonio and Brownsville, Texas, pavement blocks of mezquit are used on several streets, and said to answer the purpose excellently well.

As fuel, the wood, from both root and stem, is unsurpassed. It is the most commonly used from San Antonio, Texas, to San

Diego, California, and often the only kind obtainable. According to Dr. Loew, the charcoal made from this wood is of the best quality for metallurgical and smelting purposes.

During the summer months, from May to September, there exudes from the bark of the mezquit a gum which concretes in tears of variable size, and of a light amber color. It has the taste of gum arabic, makes excellent mucilage, and dissolves readily in three parts of water, the solution having a slight acid reaction. Chemically, it is distinguished from gum arabic in not being affected by subacetate of lead, which, in a solution of the latter, throws down a thick, white precipitate.

This gum is mostly found in old, decrepit trees, with thick, cracked bark, and accumulates in knot holes and around fractures. More rarely is it seen on young, vigorous, and smooth-barked trees. The yield is increased by practicing incisions on the trunk. In these the gum which slowly forms above, under the cambium layers, demonstrates its derivation from the descending sap. It often happens that the exudation fails to concrete, and runs upon the bark in large, black, tarry streaks and patches.

The quantity of gum naturally produced during the season by a large tree is small, probably not exceeding a third of a pound. It is doubtful whether the yield could be increased to a pound by incisions. Therefore this gum, although of prime quality, can hardly ever become an important article of trade.

The fruit of the mezquit contains nutritive principles which make it a valuable article of food. Most herbivorous animals are fond of it, and thrive on it. In the field it is a welcome though imperfect substitute for grain. Horses and mules soon learn to know the tree or bush, always abundantly fructiferous, and as soon as let loose go in search of the fallen pods lying in the grass under the thorny branches. While green, and until thoroughly ripened, the "beans" are bitter and worthless as food. At full maturity they fall to the ground, when they should be at once collected before wetted by rain and stored in a dry place. Under these conditions they keep well until the next crop. When left on the ground they soon deteriorate and decay. They have a particular enemy in a small coleopterous insect which lays its eggs in the seeds, so that in picking up an old pod we shall usually find each joint bored with a hole leading to the corresponding seed.

If we take the dry pod, thoroughly triturate it in a mortar with water, and afterwards strain, we get an aqueous extract containing all of its nutritive elements. The residue, nearly one-half (forty-seven per cent) of the whole pod, consists of shreds of the epicarp, the broken endocarp, and the seeds; it is indigestible, and always voided with the fæces. The aqueous extract, containing fifty-three per cent of the pod, consists of vegetable albumen, gum and grape-sugar, with traces of fat and salts. Its pleasant sweetness to the taste at once reveals the presence of sugar; but, owing to some interfering principle, the usual reagents fail to show even a trace of it. It is only after extraction with alcohol, evaporation, and solution in water that Fehling's test can be successfully applied. A careful analysis yielded twenty-six per cent of glucose. Dr. Loew (Rothrock, Botany W. of the 100th meridian) found thirty per cent.

Thus it is seen that mezquit "beans" differ widely from corn or oats in composition, and therefore cannot produce the same effects on animals. Only about one-half its weight being assimilable, it is a much more bulky food. It is rich in sugar and nitrogen, but deficient in starch, fat and salts. Before the advent of railroads, when grain was scarce in San Antonio, mezquit pods were regularly brought to market and sold for a dollar a bushel.

They constitute a favorite food of Mexicans and Indians. The ripe pod is ground on the "matate," the seeds picked out, and the coarse flour thus obtained is cooked into cakes, or, after seasoning, wrapped in corn-husks like "tomales." Mezquit "atole" is made by throwing the pods into boiling water; when cooked, they are put in fresh water and pounded into a pulp, which is strained; the liquor, containing in suspension and solution all the nutriment of the fruit, is drank ad libitum, and is a very pleasant beverage. Or, again, the pods may be triturated first and the flour boiled afterwards.

The infusion of this flour can easily be made to undergo alcoholic fermentation, whereby a weak beer is obtained, formerly much used by Comanche and Apache Indians.